

§ 179.400-10

$$I' = [0.046D^3 LP_c] / E$$

Where:

I = required moment of inertia of stiffening ring about the centroidal axis parallel to the vessel axis, in inches to the fourth power;

I' = required moment of inertia of combined section of stiffening ring and effective width of jacket plate about the centroidal axis parallel to the vessel axis, in inches to the fourth power;

D = outside diameter of the outer jacket, in inches;

L = one-half of the distance from the centerline of the stiffening ring to the next line of support on one side, plus one-half of the distance from the centerline to the next line of support on the other side of stiffening ring. Both distances are measured parallel to the axis of the vessel, in inches. (A line of support is:

(1) A stiffening ring which meets the requirements of this paragraph, or

(2) A circumferential line of a head at one-third the depth of the head from the tangent line);

P_c = critical collapsing pressure (37.5 psig minimum) in psig;

E = modulus of elasticity of stiffening ring material, in psi.

(e) Where loads are applied to the outer jacket or to stiffening rings from the system used to support the inner tank within the outer jacket, additional stiffening rings, or an increased moment of inertia of the stiffening rings designed for the external pressure, must be provided to carry the support loads.

[Amdt. 179-32, 48 FR 27708, June 16, 1983, as amended at 66 FR 45391, Aug. 28, 2001]

§ 179.400-10 Sump or siphon bowl.

A sump or siphon bowl may be in the bottom of the inner tank shell if—

(a) It is formed directly into the inner tank shell, or is formed and welded to the inner tank shell and is of weldable quality metal that is compatible with the inner tank shell;

(b) The stress in any orientation under any condition does not exceed the circumferential stress in the inner tank shell; and

(c) The wall thickness is not less than that specified in § 179.401-1.

§ 179.400-11 Welding.

(a) Except for closure of openings and a maximum of two circumferential

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closing joints in the cylindrical portion of the outer jacket, each joint of an inner tank and the outer jacket must be a fusion double welded butt joint.

(b) The closure for openings and the circumferential closing joints in the cylindrical portion of the outer jacket, including head to shell joints, may be a single welded butt joint using a backing strip on the inside of the joint.

(c) Each joint must be welded in accordance with the requirements of AAR Specifications for Tank Cars, appendix W (IBR, see § 171.7 of this subchapter).

(d) Each welding procedure, welder, and fabricator must be approved.

[Amdt. 179-32, 48 FR 27708, June 16, 1983, as amended at 68 FR 75763, Dec. 31, 2003]

§ 179.400-12 Postweld heat treatment.

(a) Postweld heat treatment of the inner tank is not required.

(b) The cylindrical portion of the outer jacket, with the exception of the circumferential closing seams, must be postweld heat treated as prescribed in AAR Specifications for Tank Cars, appendix W (IBR, see § 171.7 of this subchapter). Any item to be welded to this portion of the outer jacket must be attached before postweld heat treatment. Welds securing the following need not be postweld heat treated when it is not practical due to final assembly procedures:

(1) the inner tank support system to the outer jacket,

(2) connections at piping penetrations,

(3) closures for access openings, and

(4) circumferential closing joints of head to shell joints.

(c) When cold formed heads are used on the outer jacket they must be heat treated before welding to the jacket shell if postweld heat treatment is not practical due to assembly procedures.

[Amdt. 179-32, 48 FR 27708, June 16, 1983, as amended at 68 FR 75763, Dec. 31, 2003]

§ 179.400-13 Support system for inner tank.

(a) The inner tank must be supported within the outer jacket by a support system of approved design. The system and its areas of attachment to the outer jacket must have adequate strength and ductility at operating

temperatures to support the inner tank when filled with the lading to any level incident to transportation.

(b) The support system must be designed to support, without yielding, impact loads producing accelerations of the following magnitudes and directions when the inner tank is fully loaded and the car is equipped with a conventional draft gear:

Longitudinal	7" g"
Transverse	3" g"
Vertical	3" g"

The longitudinal acceleration may be reduced to 3" g" where a cushioning device of approved design, which has been tested to demonstrate its ability to limit body forces to 400,000 pounds maximum at 10 miles per hour, is used between the coupler and the tank structure.

(c) The inner tank and outer jacket must be permanently bonded to each other electrically, by either the support system, piping, or a separate electrical connection of approved design.

§ 179.400-14 Cleaning of inner tank.

The interior of the inner tank and all connecting lines must be thoroughly cleaned and dried prior to use. Proper precautions must be taken to avoid contamination of the system after cleaning.

§ 179.400-15 Radioscopy.

Each longitudinal and circumferential joint of the inner tank, and each longitudinal and circumferential double welded butt joint of the outer jacket, must be examined along its entire length in accordance with the requirements of AAR Specifications for Tank Cars, appendix W (IBR, see §171.7 of this subchapter).

[68 FR 75763, Dec. 31, 2003]

§ 179.400-16 Access to inner tank.

(a) The inner tank must be provided with a means of access having a minimum inside diameter of 16 inches. Reinforcement of the access opening must be made of the same material used in the inner tank. The access closure must be of an approved material and design.

(b) If a welded closure is used, it must be designed to allow it to be re-

opened by grinding or chipping and to be closed again by rewelding, preferably without a need for new parts. A cutting torch may not be used.

§ 179.400-17 Inner tank piping.

(a) *Product lines.* The piping system for vapor and liquid phase transfer and venting must be made for material compatible with the product and having satisfactory properties at the lading temperature. The outlets of all vapor phase and liquid phase lines must be located so that accidental discharge from these lines will not impinge on any metal of the outer jacket, car structures, trucks or safety appliances. Suitable provision must be made to allow for thermal expansion and contraction.

(1) *Loading and unloading line.* A liquid phase transfer line must be provided and it must have a manually operated shut-off valve located as close as practicable to the outer jacket, plus a secondary closure that is liquid and gas tight. This secondary closure must permit any trapped pressure to bleed off before the closure can be removed completely. A vapor trap must be incorporated in the line and located as close as practicable to the inner tank. On a DOT-113A60W tank car, any loading and unloading line must be vacuum jacketed between the outer jacket and the shut-off valve and the shut-off valve must also be vacuum jacketed.

(2) *Vapor phase line.* A vapor phase line must connect to the inner tank and must be of sufficient size to permit the pressure relief devices specified in §179.400-20 and connected to this line to operate at their design capacity without excessive pressure build-up in the tank. The vapor phase line must have a manually operated shut-off valve located as close as practicable to the outer jacket, plus a secondary closure that is liquid and gas tight. This secondary closure must permit any trapped pressure to bleed off before the closure can be removed completely.

(3) *Vapor phase blowdown line.* A blowdown line must be provided. It must be attached to the vapor phase line specified in paragraph (a)(2) of this section, upstream of the shut-off valve in that line. A by-pass line with a manually